PLAY & LEARN

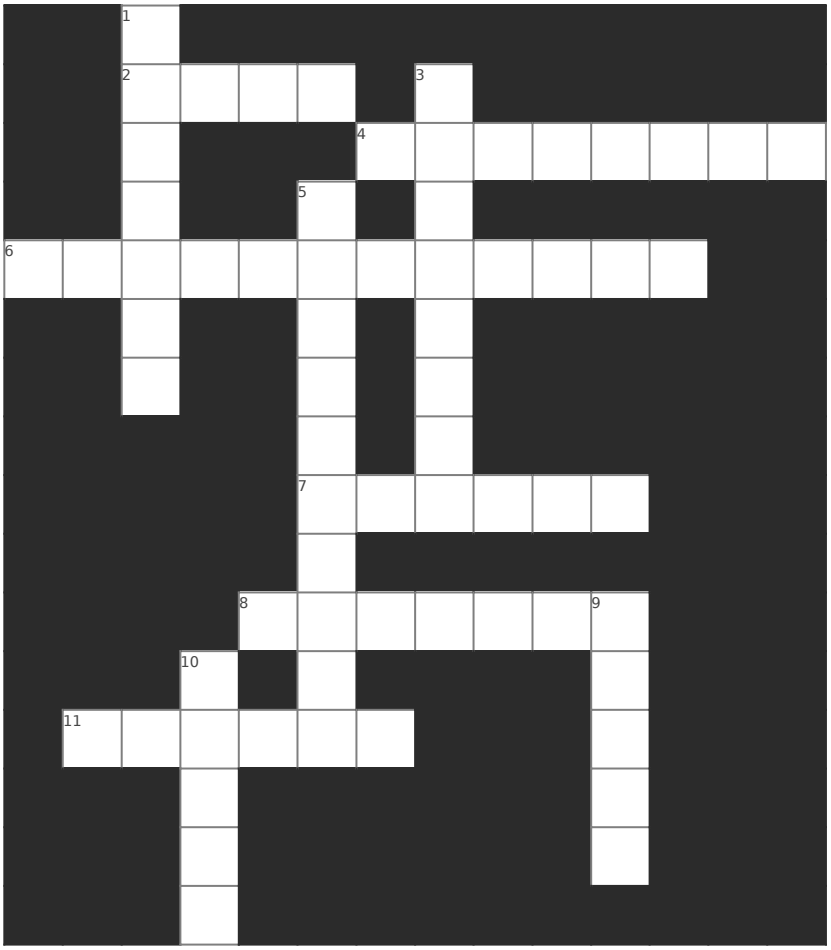
A puzzle workbook — crosswords, word searches, scrambles and quiz games

Print it. Solve it. Race a friend. Answer keys are at the back — no peeking.

#	Puzzle	Play it	Time
1	The Crossword	Solo or pairs	15 min
2	Word Search	Solo — race the clock	10 min
3	Scrambled Terms	Solo	8 min
4	Odd One Out	Teams of 4	10 min
5	Chapter Scrabble	Groups of 3–4	20 min
6	Who Am I? — Clue Cards	Whole class	15 min
7	True or False Sprint	Whole class, standing	6 min
8	Bingo	Whole class	15 min
9	Two Truths and a Lie	Pairs	10 min
10	The Escape Challenge	Teams of 4	25 min

Puzzle 1 · The Crossword

Every answer is a word from this chapter. Fill the white squares — one letter per square.



ACROSS

2. the smallest indivisible particle of an element, per Dalton (4)

4. the smallest particle of an element or compound that exists independently (8)

6. Law of ____ of Mass — mass is neither created nor destroyed (12)

7. a positively charged ion (6)

8. chemical ____ — shorthand showing a compound's composition (7)

11. surname of the scientist behind the Law of Constant Proportions (6)

DOWN

1. the combining capacity of an element (7)

3. ____ bond — formed by sharing of electrons (8)

5. the ____ method for writing chemical formulae (10)

9. a negatively charged ion (5)

10. ____ bond — formed by transfer of electrons (5)

Bonus words that did not fit the grid — define each one in a sentence: DALTON, MASS

Puzzle 2 · Word Search

16 terms are hiding in the grid — across, down, diagonally, and backwards. Circle each one, then tick it off the list. Beat 10 minutes and you win.

D	R	B	T	K	Y	T	P	Q	G	Y	M	O	T	A
B	W	A	J	E	L	U	C	E	L	O	M	A	S	R
T	O	Q	K	U	I	R	D	N	U	O	P	M	O	C
F	K	N	U	M	E	G	J	Z	C	I	N	O	I	K
Q	R	Y	D	N	X	C	O	V	A	L	E	N	T	Y
E	U	T	Q	B	C	H	A	R	G	E	U	Y	C	W
C	A	T	I	O	N	U	H	B	L	X	G	N	S	G
T	E	N	A	V	E	R	A	H	S	I	E	L	Z	S
S	F	O	R	M	U	L	A	G	H	L	L	P	A	Q
U	L	I	S	E	C	U	T	N	A	D	J	R	H	N
O	J	N	M	U	O	O	K	V	T	G	A	G	O	F
R	Q	A	G	A	W	Y	Z	N	E	I	R	T	P	H
P	D	U	O	F	S	V	B	A	K	O	L	T	A	D
R	M	M	D	K	A	S	Q	V	J	A	Z	D	V	F
E	L	E	M	E	N	T	A	F	D	M	W	I	B	J

☐ COVALENT	☐ MOLECULE	☐ COMPOUND
☐ VALENCY	☐ FORMULA	☐ ELEMENT
☐ CATION	☐ DALTON	☐ PROUST
☐ CHARGE	☐ IONIC	☐ ANION
☐ SHARE	☐ ATOM	☐ MASS
☐ BOND		

Race Rules

- **Solo:** find all the words. Note your time at the top of the page.
- **Pairs:** one partner finds across-and-down words, the other finds diagonals. First pair to complete the list wins.
- **Hard mode:** cover the word list. Find as many chapter terms as you can in 5 minutes.
- **Champion move:** for every word you find, say what it means out loud. No meaning, no point.

Puzzle 3 · Scrambled Terms

Every row is a chapter word with its letters shuffled. Unscramble it. The clue in brackets is your lifeline — try to solve without it first.

#	Scrambled letters	Clue	Your answer
1	O S S C S I C R S R	(the method used to write chemical formulae from valency)	_____
2	I C O A T O E N N S R V	(Law of ____ of Mass)	_____
3	N R P O T O R P O I	(Law of Constant ____ — fixed ratio by mass)	_____
4	I I D B I S L V I N E	(Dalton believed atoms were this)	_____
5	M A C L E R O U L	(____ mass — sum of atomic masses in a molecule)	_____
6	C L T A E O V N	(bond formed by sharing electrons)	_____
7	C T O N E R E L	(the particle transferred or shared in bonding)	_____
8	N D O P O U M C	(a substance made of two or more elements chemically joined)	_____

Make It a Game

Beat the Bell: the teacher sets a 60-second timer. Every unscrambled word inside the bell = 1 point; a word you can also *define* = 3 points.

Chain Scramble: in a circle, each student scrambles a chapter word for the person on their left. Miss it and you are out. Last student standing wins.

Puzzle 4 · Odd One Out

Three belong together. One does not. Circle the odd one — then write why in one line. The "why" is where the marks are.

#	Which is the odd one out?	Because…
1	Ionic bond · Covalent bond · Valency · Petrichor	_____
2	Cation · Anion · Molecule · Ion (charge-carrying particles)	_____
3	Dalton · Proust · Lavoisier · Tyndall	_____
4	Atom · Molecule · Compound · Displacement	_____
5	Sodium chloride · Water · Oxygen gas · Carbon dioxide (compounds vs elements)	_____
6	Formula · Valency · Criss-cross method · Fulcrum	_____

Puzzle 5 · Chapter Scrabble

Play in groups of 3–4. You have one shared rack of letter tiles. Build only terms from this chapter — no ordinary English words allowed.

Your tile rack — cut these out or write them on paper squares:

A 1	**B** 3	**C** 3	**D** 2	**E** 1	**G** 2	**H** 4
I 1	**L** 1	**M** 3	**N** 1	**O** 1	**P** 3	**R** 1
S 1	**T** 1	**U** 1	**V** 4	**X** 8	**Y** 4	**Z** 10

Scoring:

You did this	Points
Each letter tile used	Its tile value
Word is a term from this chapter	× 2
Word is 8 letters or longer	+ 10 bonus
You can state its meaning correctly	+ 5
You can connect it to a real-life example	+ 3
Word is *not* in this chapter (challenged and lost)	− 5

How a Round Works

1. Player builds a word from the rack and lays it down.
2. Any opponent may **challenge** within 10 seconds: "That's not in this chapter."
3. Open the textbook. If the challenger is right, the word is removed and the builder loses 5 points. If the challenger is wrong, the *challenger* loses 5 points.
4. Builder states the meaning to claim the +5 bonus. The group votes on whether it was correct.
5. Play 6 rounds. Highest total wins.

Target Words (worth the most — do not show your opponents)

CRISSCROSS · CONSERVATION · PROPORTION · INDIVISIBLE · MOLECULAR · COVALENT · VALENCY · COMPOUND

Puzzle 6 · Who Am I? — Clue Cards

Cut along the lines. One student draws a card and reads only the first clue aloud; the class guesses. Wrong guess? Read clue 2. Fewer clues used = more points.

CARD 1 ① I am the combining capacity of an element. ② Sodium has one of me; carbon has four. ③ I am valency.	**CARD 2** ① I form when electrons are transferred, not shared. ② Sodium chloride is held together by me. ③ I am an ionic bond.
CARD 3 ① I form when electrons are shared between atoms. ② Water molecules are held together by me. ③ I am a covalent bond.	**CARD 4** ① I am a positively charged ion. ② I have lost one or more electrons. ③ I am a cation.
CARD 5 ① I am a negatively charged ion. ② I have gained one or more electrons. ③ I am an anion.	**CARD 6** ① I proposed that atoms are indivisible, identical for one element. ② My theory is called the first modern atomic theory. ③ I am John Dalton.
CARD 7 ① I showed elements always combine in a fixed proportion by mass. ② My law is called Constant Proportions. ③ I am Joseph Proust.	**CARD 8** ① I state that mass is neither created nor destroyed in a reaction. ② I am a fundamental law of chemistry. ③ I am the Law of Conservation of Mass.
CARD 9 ① I am the shorthand way of writing a compound's composition. ② H2O is an example of me. ③ I am a chemical formula.	**CARD 10** ① I use valency criss-crossed between two elements to write a formula. ② I make writing formulae quick and systematic. ③ I am the criss-cross method.

Scoring: guessed after clue ① = **5 points** · after ② = **3 points** · after ③ = **1 point**

Puzzle 7 · True or False Sprint

Everyone stands. Teacher reads a statement. True → stay standing. False → sit down. Get it wrong and you are out. Last student standing wins.

#	Statement	Your call
1	An ionic bond forms by sharing electrons.	☐ True ☐ False
2	A covalent bond forms by sharing electrons.	☐ True ☐ False
3	A cation is a negatively charged ion.	☐ True ☐ False
4	An anion is a negatively charged ion.	☐ True ☐ False
5	John Dalton proposed that atoms are indivisible.	☐ True ☐ False
6	Joseph Proust's law states elements combine in a fixed proportion by mass.	☐ True ☐ False
7	The Law of Conservation of Mass says mass can be created in a reaction.	☐ True ☐ False
8	Valency is the combining capacity of an element.	☐ True ☐ False
9	The criss-cross method helps write chemical formulae.	☐ True ☐ False
10	A molecule of an element must always contain two different elements.	☐ True ☐ False
11	Molecular mass is the sum of the atomic masses in a molecule.	☐ True ☐ False
12	Water is an example of a compound.	☐ True ☐ False
13	Oxygen gas (O2) is a compound, not an element.	☐ True ☐ False
14	Sodium chloride is held together by an ionic bond.	☐ True ☐ False

Puzzle 8 · Bingo

Each student fills the empty grid below with any 16 words from the word bank — in any order, one per box. The teacher then reads out meanings, not names. Cross a box only when its meaning is called. First to a full row, column or diagonal shouts BINGO.

Word bank — choose any 16:

Valency	Ionic bond	Covalent bond	Cation
Anion	Molecule	Dalton	Proust
Formula	Criss-cross method	Conservation of mass	Atom
Molecular mass	Compound	Element	

Your bingo card:

> **□ Caller’s List (teacher only — read the meaning, never the name)**
>
> ① "I am the combining capacity of an element." ② "I form when electrons are transferred." ③ "I form when electrons are shared." ④ "I am a positively charged ion." ⑤ "I am a negatively charged ion." ⑥ "I proposed that atoms are indivisible." ⑦ "I showed elements combine in a fixed mass ratio." ⑧ "I am the shorthand for a compound's composition." ⑨ "I use criss-crossed valencies to build a formula." ⑩ "I state mass is neither created nor destroyed." □ "I am the sum of atomic masses in a molecule." □ "I am made of two or more elements chemically joined."

Puzzle 9 · Two Truths and a Lie

Each set has three statements. Two are true, one is a lie. Circle the lie — and correct it in one line.

Set 1

(a) Ionic bonds involve transfer of electrons.
(b) Covalent bonds involve transfer of electrons.
(c) Covalent bonds involve sharing of electrons.

The lie is _____ . Corrected: _____

Set 2

(a) A cation is positively charged.
(b) A cation has gained electrons.
(c) A cation has lost electrons.

The lie is _____ . Corrected: _____

Set 3

(a) Dalton said atoms are indivisible.
(b) Dalton said atoms of different elements are identical.
(c) Proust discovered the Law of Constant Proportions.

The lie is _____ . Corrected: _____

Set 4

(a) The Law of Conservation of Mass applies to chemical reactions.
(b) Mass can increase during a reaction.
(c) Mass is neither created nor destroyed in a reaction.

The lie is _____ . Corrected: _____

Puzzle 10 · The Escape Challenge

Solve all five gates. Each gives you one digit. Collect all five to unlock the exit code.

🔒 GATE 1 — The Bond Gate

How many main bond types are named (ionic, covalent)? Use that number.

Digit: ☐

🔒 GATE 2 — The Ion Gate

How many ion types are named (cation, anion)? Use that number.

Digit: ☐

🔒 GATE 3 — The Law Gate

How many laws of chemical combination are named (conservation of mass, constant proportions)? Use that number.

Digit: ☐

🔒 GATE 4 — The Formula Gate

Count the letters in ATOM.

Digit: ☐

🔒 GATE 5 — The Scientist Gate

Count the letters in DALTON.

Digit: ☐

EXIT CODE: ☐ ☐ ☐ ☐ ☐

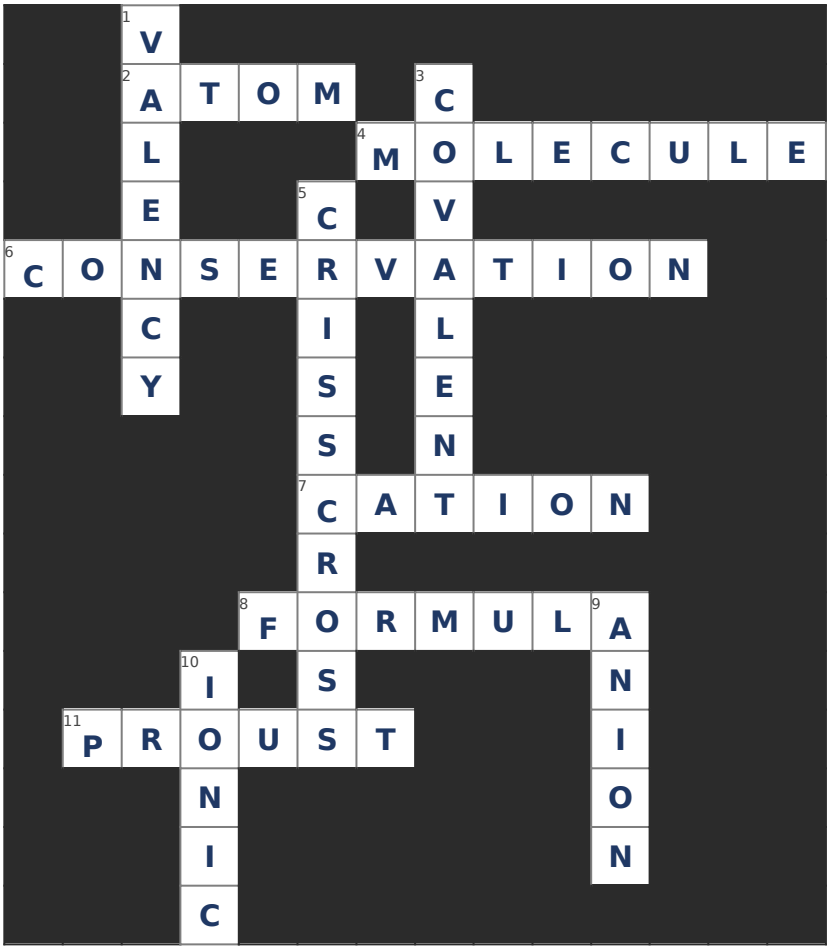
📋 Teacher's note

Hide the gate cards around the classroom. Teams rotate every 4 minutes. First team to reach the door with the correct code escapes. Losing teams try again next period.

Answer Keys

Teachers and self-checkers only. Solve first — the puzzle is the point.

Puzzle 1 · Crossword — Solved Grid



Across: 2 ATOM · 4 MOLECULE · 6 CONSERVATION · 7 CATION · 8 FORMULA · 11 PROUST

Down: 1 VALENCY · 3 COVALENT · 5 CRISSCROSS · 9 ANION · 10 IONIC

Puzzle 2 · Word Search — Solved Grid

D	R	B	T	K	Y	T	P	Q	G	Y	**M**	**O**	**T**	**A**
B	W	A	J	**E**	**L**	**U**	**C**	**E**	**L**	**O**	**M**	A	S	R
T	**O**	Q	K	U	I	R	**D**	**N**	**U**	**O**	**P**	**M**	**O**	**C**
F	K	**N**	U	M	E	G	J	Z	**C**	**I**	**N**	**O**	**I**	K
Q	R	Y	**D**	N	X	**C**	**O**	**V**	**A**	**L**	**E**	**N**	**T**	**Y**
E	U	T	Q	B	**C**	**H**	**A**	**R**	**G**	**E**	U	Y	**C**	W
C	**A**	**T**	**I**	**O**	**N**	U	H	B	L	X	G	**N**	S	G
T	E	**N**	A	V	**E**	**R**	**A**	**H**	**S**	I	**E**	L	Z	S

S	**F**	**O**	**R**	**M**	**U**	**L**	**A**	G	H	**L**	L	P	A	Q
U	L	**I**	S	E	C	U	T	N	**A**	D	J	R	H	**N**
O	J	**N**	**M**	U	O	O	K	**V**	T	G	A	G	**O**	F
R	Q	**A**	G	**A**	W	Y	Z	N	E	I	R	**T**	P	H
P	D	U	O	F	**S**	V	B	A	K	O	**L**	T	A	D
R	M	M	D	K	A	**S**	Q	V	J	**A**	Z	D	V	F
E	**L**	**E**	**M**	**E**	**N**	**T**	A	F	**D**	M	W	I	B	J

Puzzle 3 · Scrambled Terms

1. CRISSCROSS · 2. CONSERVATION · 3. PROPORTION · 4. INDIVISIBLE · 5. MOLECULAR · 6. COVALENT · 7. ELECTRON · 8. COMPOUND

Puzzle 4 · Odd One Out

#	Odd one	Because
1	Petrichor	the other three are bonding concepts; petrichor (rain smell) belongs to Chapter 5
2	Molecule	cation, anion and ion involve charge; a molecule is typically neutral overall
3	Tyndall	the other three are chemists linked to atomic theory/laws of chemical combination; Tyndall is a Ch.5 physicist
4	Displacement	atom, molecule and compound are all chemistry particle concepts; displacement is a Chapter 4 motion term
5	Oxygen gas	sodium chloride, water and carbon dioxide are compounds; oxygen gas is an element
6	Fulcrum	formula, valency and criss-cross method are all chemistry terms; fulcrum belongs to Chapter 7

Puzzle 7 · True or False Sprint

1-F · 2-T · 3-F · 4-T · 5-T · 6-T · 7-F · 8-T · 9-T · 10-F · 11-T · 12-T · 13-F · 14-T

Puzzle 9 · Two Truths and a Lie

Set	The lie	Correction
1	b	Covalent bonds involve SHARING electrons, not transferring them.

Set	The lie	Correction
2	b	A cation forms by LOSING electrons, not gaining them — gaining electrons makes an anion.
3	b	Dalton said atoms of the SAME element are identical, not different elements.
4	b	Mass cannot increase or decrease overall — it is conserved.

Puzzle 10 · The Escape Challenge

EXIT CODE: 2 · 2 · 2 · 4 · 6

(Answer: 2) (Answer: 2) (Answer: 2) (Answer: 4) (Answer: 6)

Now go write the formulae for five compounds in your kitchen using the criss-cross method. □□